



This PDF file is an excerpt from the EPA sampling report entitled *Sampling Episode Report - Holland America Veendam - Sampling Episode 6503* (March 2006). The full report can be downloaded from [http://www.epa.gov/owow/oceans/cruise\\_ships/veendam.html](http://www.epa.gov/owow/oceans/cruise_ships/veendam.html)

# **Sampling Episode Report Holland America Veendam Sampling Episode 6503**

**Cover Page and  
Table of Contents**

**March 2006**



# Sampling Episode Report Holland America Veendam Sampling Episode 6503

U.S. Environmental Protection Agency

Oceans and Coastal Protection Division  
Office of Wetlands, Oceans, and Watersheds

Engineering and Analysis Division  
Office of Science and Technology

Office of Water  
1200 Pennsylvania Avenue, NW  
Washington, D.C. 20460

March 2006

---

## **ACKNOWLEDGMENT AND DISCLAIMER**

This report was prepared by the Engineering and Analysis Division of the Office of Science and Technology and the Oceans and Coastal Protection Division of the Office of Wetlands, Oceans, and Watersheds of the U.S. Environmental Protection Agency. Neither the United States Government nor any of its employees, contractors, subcontractors, or their employees make any warrant, expressed or implied, or assume any legal liability or responsibility for any third party's use of, or the results of, such use of any information, apparatus, product, or process discussed in this report, or represents that its use by such party would not infringe on privately owned rights.

The primary contact regarding questions or comments on this document is:

Dr. Elizabeth Kim  
U.S. Environmental Protection Agency  
Oceans and Coastal Protection Division, OWOW (4504T)  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
(202) 566-1270 (telephone)  
(202) 566-1546 (fax)  
[kim.elizabeth@epa.gov](mailto:kim.elizabeth@epa.gov)

For detailed technical inquiries on this document:

Donald Anderson  
U.S. Environmental Protection Agency  
Engineering and Analysis Division, OST (4303T)  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
(202) 566-1021 (telephone)  
(202) 566-1053 (fax)  
[anderson.donald@epa.gov](mailto:anderson.donald@epa.gov)

## TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY .....	vi
1.0 INTRODUCTION .....	1-1
2.0 WASTEWATER SYSTEM AND SAMPLING POINTS .....	2-1
2.1 Wastewater Generation and Collection .....	2-1
2.2 Wastewater Treatment .....	2-1
2.3 Wastewater and Residual Sample Collection Points .....	2-4
2.4 Flow Meter Locations .....	2-5
3.0 SAMPLE COLLECTION AND ANALYSIS METHODOLOGY .....	3-1
3.1 Pre-Sampling Activities .....	3-1
3.2 Sample Collection and Analysis Methodology .....	3-1
3.3 Converting Solids Mass Units to Volume Units .....	3-2
3.4 Quality Assurance/Quality Control .....	3-3
3.5 Interview with the Ship's Crew .....	3-3
3.6 Deviations from the Sampling and Analysis Plan .....	3-4
4.0 RESULTS AND DISCUSSION .....	4-1
4.1 Laboratory Analytical Results and Discussion .....	4-1
4.1.1 Graywater .....	4-1
4.1.2 Influent to Treatment System .....	4-3
4.1.3 Influent to the Ultraviolet (UV) Disinfection Part of the Treatment System .....	4-7
4.1.4 Effluent from the Treatment System .....	4-7
4.1.5 Wastewater Treatment System Performance: Comparison of Influent to Treatment System and Effluent from Treatment System .....	4-10
4.1.6 Screening Solids, Waste Biosludge, and Incinerator Ash ....	4-12
4.1.7 Source Water .....	4-12
4.2 Summary of Interviews Regarding Activities that Impact Wastewater Generation .....	4-13
4.2.1 Wastewater Generation .....	4-13
4.2.2 Pesticide, Fungicide, and Rodenticide Use .....	4-15
4.3 Flow Data .....	4-16
5.0 DATA QUALITY .....	5-1
5.1 Analytical Quality Control .....	5-1
5.1.1 Cyanide Results .....	5-2
5.1.2 Mercury Results .....	5-2
5.2 Field Quality Control .....	5-3
5.2.1 Trip Blank .....	5-3
5.2.2 Equipment Blank .....	5-3

## TABLE OF CONTENTS (Continued)

	<b>Page</b>
5.2.3 Field Duplicates .....	5-4
6.0 REFERENCES .....	6-1
Appendix A ANALYTICAL RESULTS	
Appendix A-1 Pathogen Indicators Analytical Results, Holland America Veendam .....	A-1
Appendix A-2 Analytical Results, Except Pathogen Indicators, Holland America Veendam .....	A-9
Appendix A-3 Analytical Results Collected Onboard, Holland America Veendam .....	A-100
Appendix B RAW FLOW DATA COLLECTED FROM 18 JUNE THROUGH 25 JUNE 2004	
Appendix C INTERVIEW RESULTS FOR ACTIVITIES THAT IMPACT WASTEWATER GENERATION	
Appendix D DATA REVIEW NARRATIVES AND OTHER ANALYTICAL ISSUES	
Appendix E SAMPLING AND ANALYSIS PLAN FOR HOLLAND AMERICA VEENDAM SAMPLING EPISODE 6503	

## LIST OF TABLES

		<b>Page</b>
2-1	Wastewater, Sampling Point, and Flow Meter Descriptions Holland America Veendam .....	2-7
2-2	Treatment Residuals and Incinerator Ash Descriptions Holland America Veendam .....	2-11
3-1	Sample Collection Method Descriptions, Holland America Veendam .....	3-5
3-2	Sample Collection Methods and Analyte Groups Tested by Sampling Point, Holland America Veendam .....	3-6
3-3	Analytes and Analytical Methods, Holland America Veendam .....	3-11
3-4	Field Measurement Equipment, Holland America Veendam .....	3-12
3-5	Deviations from the Sampling and Analysis Plan, Holland America Veendam .....	3-13
4-1	Graywater Analytical Results, Holland America Veendam .....	4-19
4-2	Influent to Treatment System Analytical Results, Holland America Veendam .....	4-23
4-3	Influent to UV Disinfection Analytical Results, Holland America Veendam .....	4-28
4-4	Effluent from Treatment System Analytical Results, Holland America Veendam .....	4-29
4-5	Wastewater Treatment System: Performance Data for Pathogen Indicators, Holland America Veendam .....	4-34
4-6	Wastewater Treatment System: Performance Data for Analytes Other Than Pathogen Indicators, Holland America Veendam .....	4-35
4-7	Treatment System Residuals and Incinerator Ash Analytical Results, Holland America Veendam .....	4-39
4-8	Source Water Analytical Results, Holland America Veendam .....	4-43
4-9	Laundry Cleaning Agents Used Onboard, Holland America Veendam .....	4-44
4-10	Flow Data by Sampling Period, Holland America Veendam .....	4-45

## LIST OF TABLES (Continued)

		Page
5-1	Available and Total Cyanide Analytical Results, Holland America Veendam . . . . .	5-7
5-2	Equipment Blank Analytical Results, Holland America Veendam . . . . .	5-8
5-3	Field Duplicate Analytical Results for Classical Pollutants (Except HEM/SGT- HEM), Total and Dissolved Metals, and Semivolatile Organics, Holland America Veendam . . . . .	5-9
5-4	Field Duplicate Analytical Results for Pathogen Indicators, HEM/SGT- HEM, Volatile Organics, and Dioxins and Furans in Incinerator Ash, Holland America Veendam . . . . .	5-17

## LIST OF FIGURES

		<b>Pages</b>
2-1	Graywater and Sewage Collection, Holding and Transfer System, Holland America Veendam .....	2-12
2-2	Zenon Treatment System, Holland America Veendam .....	2-13
4-1	Total Daily Flow, Holland America Veendam .....	4-46
4-2	Average Hourly Wastewater Treatment System Flow, Holland America Veendam .....	4-47